



STATEMENT

I, Yoshikazu SAKA of c/o NGB Corporation, Ark Mori Building 13F 12-32, Akasaka 1-chome, Minato-ku, Tokyo 107-6013, Japan, hereby declare that I am conversant with both the English and Japanese languages and certify to the best of my knowledge and belief that the attached is a true and correct English translations of the priority documents of Japanese patent application No.2000-180032 filed on June 15, 2000, Japanese patent application No.2001-013615 filed on January 22, 2001, and Japanese patent application No.2001-013448 filed on January 22, 2001.

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A handwritten signature in black ink, appearing to be "Yoshikazu SAKA", written over a horizontal line.

Yoshikazu SAKA



JAPAN PATENT OFFICE

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[Title of the Invention] Color Conversion System, Color
Conversion Server

[Scope of Claims]

5 [Claim 1] A color conversion system in which one or plural
client systems and a color conversion server are connected via
a communication path, the color conversion system characterized
in that an output device is provided in at least one of the
client systems and has a calibration function for adjusting
10 color reproducibility of the output device; and the color
conversion server performs color conversion for image data sent
from any of the client systems on the basis of color conversion
information, which is set for each output device in advance,
receives information at the calibration time from the client
15 system in which the output device is provided and manages the
color reproducibility of the output device based on the
information.

 [Claim 2] The color conversion system according to claim
1, characterized in that the color conversion server corrects
20 the color conversion information, if necessary, on a basis of
the information at the calibration time received from the client
system.

 [Claim 3] The color conversion system according to claim
1 or claim 2, characterized in that when calibration has not
25 been performed in the output device within a predetermined period,

the color conversion server gives a warning to the client system in which the output device is provided.

[Claim 4] The color conversion system according to any one of claims 1 to claim 3, characterized in that the color conversion server analyzes the information at the calibration
5 time received from the client system, and in the case where the color reproducibility of the output device is out of a predetermined criteria, gives a warning to the client system in which the output device is provided.

10 [Claim 5] A color conversion system in which one or plural client systems and a color conversion server are connected via a communication path, the color conversion system characterized in that the color conversion server performs the color conversion for image data sent from any of the client systems on the basis
15 of color conversion information, which is set for each output device provided in at least one client system in advance and corrects the color conversion information, which is set to corresponds to each output device, on a basis of a color measurement sample output from the output device.

20 [Claim 6] The color conversion system according to claim 5, characterized in that the color conversion server gives a warning to the client system in which the output device is provided when correction processing, which uses the color measurement sample, in the color conversion information has
25 not been performed for the output device within a predetermined

period.

[Claim 7] The color conversion system according to claim 5 or claim 6, characterized that the color conversion server gives a warning to the client system in which the output device is provided when it is determined from the color measurement sample that the color reproducibility of the output device, which outputs the color measurement sample, is out of the predetermined criteria.

[Claim 8] The color conversion system according to any one of claim 5 to claim 7, characterized in that the color measurement sample is classified into a plurality of ranks.

[Claim 9] The color conversion system according to any one of claims 1 to claim 8, characterized in that the color conversion server answers color management status of the output device in response to inquiries from the client systems.

[Claim 10] The color conversion system according to any one of claims 1 to claim 9, characterized in that the color conversion server charges for management processing such as correction of the color conversion information and/or the warning.

[Claim 11] A color conversion server characterized by comprising: color conversion information storage means for storing color conversion information associated with output devices; communication means for communicating with an external client system through a communication path; color conversion

means for receiving image data and instruction information specifying an output device, which are sent from the client system through the communication path, for acquiring the color conversion information specified by the instruction
5 information from the color conversion information storage means, and for performing the color conversion processing for the image data; and color management means for acquiring information at calibration time in the output device through the communication means and for managing color reproducibility of the output device
10 wit using the information.

[Claim 12] The color conversion server according to claim 11, characterized in that the color management means corrects color conversion information, which corresponds to the output device and is stored in the color conversion information storage
15 means based on the information at the calibration time in the output device, if necessary.

[Claim 13] The color conversion server according to claim 11 or claim 12, characterized in that when the calibration has not been performed in the output device within a predetermined
20 period, the color management means gives a warning to a client system in which the output device is provided.

[Claim 14] The color conversion server according to any one of claim 11 to claim 13, characterized in that the color management means analyzes the information at the calibration
25 time in the output device, and in the case where the color

reproducibility of the output device is out of a predetermined criteria, gives a warning to the client system in which the output device is provided.

[Claim 15] A color conversion server characterized by
5 comprising: color conversion information storage means for
storing color conversion information associated with output
devices; communication means for communicating with an external
client system through a communication path; color conversion
means for receiving image data and instruction information
10 specifying an output device, which are sent from the client
system through the communication path, for acquiring the color
conversion information specified by the instruction
information from the color conversion information storage means,
and for performing the color conversion processing for the image
15 data; and color management means for correcting, on a basis
of a color measurement sample output from an output device,
color conversion information, which corresponds to the output
device and is stored in the color conversion information storage
means.

20 [Claim 16] The color conversion server according to claim
15, characterized in that when correction processing of the
color conversion information, which uses the color measurement
sample corresponding to the output device, has not been performed
within a predetermined period, the color management means gives
25 a warning to the client system in which the output device is

provided.

[Claim 17] The color conversion server according to claim 15 or claim 16, characterized in that when it is determined from the color measurement sample that the color reproducibility of the output device, which outputs the color measurement device, is out of a predetermined criteria, the color management means gives a warning to the client system in which the output device is provided.

[Claim 18] The color conversion server according to any one of claim 15 to claim 17, characterized in that the color measurement sample is classified into a plurality of ranks.

[Claim 19] The color conversion server according to any one of claim 11 to claim 18, characterized in that the color management means answers color management status of the output device in response to inquiries from the client systems.

[Claim 20] The color conversion system according to any one of claim 11 to claim 19, characterized in that the color management means charges for management processing such as correction of the color conversion information and/or the warning.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The invention relates to a color conversion system in which one or plural client system and a color conversion server

are connected via a communication path and a color conversion server suitably used in such a color conversion system.

[0002]

[Related arts]

5 To prepare printed matter, steps of planning, design, production, proofreading, plate-making, printing plate, and final printing are executed. Various peoples and enterprises are involved in the steps. FIG. 5 is an explanatory drawing showing an example of an outline of a production process of
10 general printed matter. In the figure, numeral 61 denotes a client, numeral 62 denotes a production company, numeral 63 denotes a plate-making company, numeral 64 denotes a printing company, numeral 71 denotes a production system, numeral 72 denotes a comprehensive layout, numeral 81 denotes an image
15 setter, numeral 82 denotes a film, numeral 83 denotes plate-making, numeral 84 denotes a PS plate, numeral 85 denotes a flatbed proofreading machine, numeral 86 denotes proof, numeral 91 denotes a printer, and numeral 92 denotes printed matter. The production company 62 determines the concept of
20 printed matter with the client 61 and uses the production system 71, etc., to design the printed matter. At this time, the image (outline) of the printed matter designed is converted into raster data in the production system 71 and color conversion processing, etc., is performed and then the result is output on a printer
25 in the production system 71 to prepare the comprehensive layout

72. Using the comprehensive layout 72, the production company 62 makes arrangements with the client 61 for determining the specific printed matter image (outline). If the production company 62 comes to an agreement with the client 61 using the comprehensive layout 72, the image data in the production system 71 at the time is passed to the plate-making company 63.

[0003]

In the plate-making company 63, an image is provided by the image setter 63, for example, based on the image data passed from the production company 62 and color conversion processing, etc., is performed and color films 82 of Y, M, C, and K, for example, are prepared. In the plate-making 83, the films 82 are burnt into the PS plates 84. A printing plate may be prepared directly from the image data passed from the production company 62 by CTP (computer to plate).

[0004]

The PS plates 84 thus prepared can be used to print on the printer 91; final proofreading is executed before actual printing is executed. Thus, using the PS plates 84, the proof 86 is prepared with the flatbed proofreading machine of a manual printer and consent of the client 61 is obtained. To make a correction at this point in time, the process is again executed starting at preparation of the films 82.

[0005]

If consent of the client 61 is obtained and the proof

is OKed, the proof 86 and the films 82 are brought into the printing company 64 and in the printing company 64, the PS plates 84 are prepared and the printed matter 92 is printed on the printer 91. At this time, the printer 91 is adjusted so that
5 the color of the printed matter 92 becomes almost the same as the color of the proof 86. After this, cutting, binding, and the like are performed to complete final printed matter.
[0006]

In such a printing process, the client 61 makes a final
10 check using the proof 86, because the proof 86 has color reproducibility closest to the finished quality of the final printed matter 92. In the related art, the sales representative in the production company or the plate-making company takes the proof 86 with him or her to the client 61 for obtaining
15 consent of the client 61; this is a large burden from the points of costs and time. To make a correction, it is necessary to again execute the process starting at preparation of the films 82 and there is a problem of the long process at high costs.
[0007]

20 The comprehensive layout 72 is also prepared in the production company 62 and it is also possible to execute the final proofreading using the comprehensive layout 72. In fact, however, the color conversion characteristic in the production system 71 and the color reproduction characteristic of the
25 printer differ from the color characteristic in the process

of preparing the proof 86 and therefore the comprehensive layout 72 and the proof 86 vary in hue or tint even if the same image data is used. Thus, if the proof is OKed in the state of the comprehensive layout 72 and printing is executed as it is, the hue or tint of the printed matter may differ from that at the proofreading time and the client 61 will make an objection. Therefore, it is impossible to execute the final proofreading using the comprehensive layout 72; this is a problem.

[0008]

10 In recent years, an apparatus for preparing a proof responsive to the used printer based on the image data prepared in the production company 62 (DDCP) has also been developed. The apparatus can be used to prepare the proof 86 without preparing the films 82 or the PS plates 84, and the proofreading cost can be reduced. A similar apparatus is installed, whereby the proof 86 can also be output in any other than the plate-making company. However, such an apparatus is very expensive and the production company or the client cannot afford to install the apparatus. Therefore, the process in which the plate-making company 63 prepares the proof 86 and presents the proof 86 to the client 61 in the related art as described above cannot be changed.

[0009]

In order to these problems, it has been proposed that for example, a color conversion server is provided and shared

to thereby perform color conversion so that substantially the same color reproduction can be made with any of printers provided in the client 61, the production company 62 and the plate-making company 63. With this configuration, it becomes possible to
5 proofread to some extent with using an output in the client 61 or the production company 62 as a proof. As a result, producing period can be shortened and troublesome task that sales representative visits can be eliminated.

[0010]

10 However, in the output devices such as printers, the reproduced color will change with time or will change because of replacement of parts such as consumable items. Thus, if color reproduction similar to that on the proof 86 can be accomplished at one point in time on the output device such
15 as the printer installed in the client 61 or the production company 62, the later color reproduction is not necessary the same as the previous color reproduction. Therefore, the color difference between output and the proof 86 in the client 61 or the production company 62 grows with the passage of time,
20 and it is made impossible to conduct color proofreading based on the output in the client 61 or the production company 62; this is a problem.

[0011]

[Problem to be Solved by the Invention]

25 In view of the above-described circumstances, the

invention has been made, and it is an object of the invention to provide a color conversion system, which can obtain an image of a printed matter, which has the same color reproduction as the final printed matter, at any stage and with any output device, and a color conversion server, which can be used in such a color conversion system.

[0012]

[Means for Solving the Problem]

In the invention, color conversion information for each output device provided in a client system is set in a color conversion server in advance, and color conversion processing is performed for image data sent from the client system, using the color conversion information. For example, if the color conversion information for the respective output devices are set so that colors output from the respective output devices substantially match with a target color (e.g., a reproduced color in a proof), substantially the same color reproduction can be achieved whenever any output device outputs.

[0013]

However, it will become impossible to guarantee color match with the passage of time. Then, in the invention, color management in each output device is conducted in the color conversion server. For example, the output device or the client system in which the output device is installed may have the calibration function for adjusting the color reproducibility

of the output device. In such a case, color reproducibility change with time can be overcome by the calibration function of the output device. The information at the calibration time is also transferred to the color conversion server, so that

5 the color reproducibility of the output device can be managed in the color conversion server. For example, the color conversion information can be corrected as required based on the information at the calibration time received from the client system. Accordingly, the optimum color conversion processing

10 can always be performed. When calibration is not conducted during a predetermined time period in the output device, the client system in which the output device is installed can be warned. Accordingly, color difference, etc., caused by reproduced color change with time can be prevented. Further,

15 the information at the calibration time received from the client system is analyzed and if the color reproducibility of the output device is out of a predetermined criterion, the client system in which the output device is installed can be warned. If the reproduced color varies, for example, because a color shift

20 occurs beyond the range in which the color can be adjusted by the calibration function, a warning message indicating the fact can be previously given.

[0014]

For example, if calibration cannot be conducted in the

25 output device or the client system in which the output device

is installed, a color measurement sample is output on the output device and the color conversion information set corresponding to the output device is corrected based on the color measurement sample. Accordingly, if color reproduction change with time
5 occurs in the output device, the color conversion server performs color conversion processing in response to the change and thus the color reproducibility can always be guaranteed. Also in this case, when the color conversion information correction processing using the color measurement sample for the output
10 device is not executed during a predetermined time period, the client system in which the output device is installed can be warned, and if it is determined from the color measurement sample that the color reproducibility of the output device outputting the color measurement sample is out of a predetermined criterion,
15 the client system in which the output device is installed can be warned. The color measurement samples are classified into a plurality of ranks, so that the calibration accuracy can be ranked. It is also made possible to conduct calibration responsive to the color conversion accuracy.

20 [0015]

The color management in each output device is thus conducted in the color conversion server, whereby the color reproducibility can always be guaranteed. The color management situation of the output device can be returned to the client
25 system in response to inquiry sent from the client system. A

charge can also be made for either or both of correcting the color conversion information and management processing of warning, etc. Accordingly, it is made possible to establish color reproducibility management as business.

5 [0016]

[Embodiments of the Invention]

Fig. 1 is a configuration diagram showing one embodiment of a color conversion system of the invention. In the figure, numeral 1 denotes a conversion server, numeral 2 denotes the Internet, numerals 3 and 4 denote client systems, numerals 11, 32 and 42 denote communication sections, numeral 12 denotes a color conversion section, numeral 13 denotes a color conversion information storage section, numeral 14 denotes a rasterizing section, numeral 15 denotes a color management section, numerals 31 and 43 denote output devices, and numeral 41 denotes an instruction terminal. In the color conversion system shown in Fig. 1, the color conversion server 1 and the client systems 3 and 4 are connected via the Internet 2. For example, the color conversion system can be configured so that the client system 3 is installed in the production company and the client system is installed in the orderer or the printing company. Of course, the client systems connectable to the color conversion server 1 are noted limited to two, the color conversion system can be configured so that desired number of client systems is connectable thereto. Here, the Internet 2 is shown as

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15

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25

intercommunication path. However, every communication form regardless of wired or radio, such as a telephone line, an exclusive line and a LAN, can be used.

[0017]

5 The color conversion server 1 includes the communication section 11, the color conversion section 12, the color conversion information storage section 13, the rasterizing section 14 and the color management section 15. The communication section 11 receives image data and instruction information specifying
10 an output device through the Internet 2. Then, the communication section 11 inputs the received image data and instruction information to the color conversion section 12. Also, the communication section 11 transfers the image data, which undergone color conversion processing in the color
15 conversion section 12, or image data, which is converted into raster data in the rasterizing section 14, to client systems in accordance with the instruction information. Furthermore, the communication section 11 receives calibration information sent from a client system in which an output device is installed
20 and transfers it to the color management section 15, transmits kinds of warning issued from the color management section 15 to client systems and receives inquiries about statuses of the output devices to the color management section 15 and transmits a response thereto from the color management section 15.

25 [0018]

The color conversion section 12 extracts color conversion information corresponding to the output device specified by the instruction information from the color conversion information storage section 13, and performs the color conversion processing for the image data in accordance with the color conversion information. The color conversion information storage section 13 stores the color conversion information corresponding to the respective output devices. The color conversion information are set so that a color output by an output device on a basis of image data is a target color. Thus, since the color conversion section 12 performs the color conversion processing using the color conversion information, when the output device outputs the image data undergone the color conversion processing, an image has almost the same color reproduction as the target color.

[0019]

For example, the target color may be set to a color, which is reproduced in a proof conventionally used. The color conversion information is set so that the target color is reproduced by the respective output devices. The output devices are different in color reproduction characteristics, depending on printing system, model and machine property. The color conversion information storage section 13 stores the color conversion information used in the color conversion processing in advance, with considering the color reproduction

characteristics of the respective output devices. If the color conversion processing is performed using the color conversion processing corresponding to the output device, when image data is output by the output device, the output image is color-reproduced with substantial target image.

[0020]

FIG. 2 is a schematic representation of an example of the configuration of the color conversion information storage section. In the example shown in FIG. 2, the color conversion information is stored with being associated with the output devices and the target colors, its color conversion accuracy is ranked, color conversion information for each rank can be set. For example, when the target color is target A, color conversion is performed with rank 1 at which the highest accuracy color conversion is performed, and an image is output on the output device 31 in the client system 3, color conversion information a1 is used to execute color conversion. Likewise, when the target color is target A, color conversion is performed with rank 1 and an image is output on the output device 43 in the client system 4, color conversion information b1 is used to execute color conversion. Accordingly, the reproduced colors of the image output on the output device 31, the image output on the output device 43, and the printed image can be almost matched with each other.

[0021]

Even when output is produced on the same output device, for example, if the printer for finally printing printed matter differs, such color conversion information is used that color reproduction almost matches the target color responsive to the characteristic of the printer. For example, in a case of outputting on the output device 31 in the client system 3 with the rank 1, if the target color is target A, color conversion information a1 is used to execute color conversion; if the target color is target B, color conversion information c1 is used to execute color conversion. Accordingly, color reproduction responsive to the printer, etc., can be accomplished.

[0022]

Furthermore, if color reproduction is performed on the same output device and with the same target color, high color reproducibility may not be required depends on a stage in a production process of a printed matter, for example, at an initial stage of production of the printed matter. In this case, color conversion processing involving high load may not be performed. For example, at the initial stage of the production of the printed matter, large value may be specified for rank to perform color conversion processing. Then, when a time point of determining colors rolls around, smaller value of rank is specified to perform color conversion processing. At a time of color proof reading or at a time of outputting in the plate-making company or the printing company, the rank

1 may be specified to perform color conversion processing.

[0023]

Some output devices or some target colors may share color conversion information, which has low rank in color conversion accuracy. Of course, it is possible to configure system without ranks. If the target color is fixed to one color, there is no need to provide color conversion information for each target color.

[0024]

10 Each piece of color conversion information can be provided, for example, by making an output device to output a color measurement sample, measuring a result of the color measurement sample with a color measuring instrument and comparing the color measurement value with the target color. Such color conversion information is previously registered in the color conversion information storage section 13 in the color conversion server 1. Calculation processing to provide such color conversion information can also be performed in the color management section 15 as well as in outside.

20 [0025]

Turning to Fig. 1, when received image data is data described in description language such as PDL and is transferred to an output device as raster data, the rasterizing section 14 converts the image data undergone the color conversion processing in the color conversion section 12 into the raster

data. For example, if the conversion processing is performed while holding many fonts and special fonts, it is not necessary for each client system to hold expensive and large amount of font data. When the received image data is raster data or when
5 an output device to which a processing result is transferred is a device for receiving data described in description language such as PDL and outputting, it is not necessary to perform the processing in the rasterizing section 14. Also, there is no need to convert into the raster data, the rasterizing section
10 14 may not be provided.

[0026]

The color management section 15 manages status of color reproduction performed in the respective output devices. For example, in the case where an output device or a client system
15 in which the output device is installed has a calibration function for reproduced color, the color management section 15 manages whether or not the reproduced color is adjusted using the calibration function. Specifically, the color management section 15 acquires information at the calibration time from
20 the output device or the client system in which the output device is installed, and confirms whether or not calibration processing is performed within a predetermined period. When the calibration processing is not performed during the predetermined time period, since there is possibilities that
25 the color reproducibility is not warranted, the color management

section 15 warns the client system and promotes to execute the calibration processing. Further, the color management section 15 analyzes the acquired information at the calibration time, and if the color reproducibility of the output device is out
5 of a predetermined criterion, the color management section 15 warns the client system in which the output device is installed and promotes to perform maintenance operation for the output device. The color management section 15 may correct color conversion information, which corresponds to the output device
10 and is stored in the color conversion information storage section 14 on the basis of the received information at the calibration time, if necessary.

[0027]

The information at the calibration time received at the
15 color management section 15 may include date and time at which the calibration processing is performed, and information obtained when a color measuring instrument reads a color measurement sample at the calibration time. This information at the calibration time can be acquired by periodically making
20 an inquiry from the color conversion server 1 to the client system in which the output device is installed. Alternately, this information at the calibration time can be notified to the color conversion server 1 when the calibration processing is executed in the client system.

25 [0028]

Also, in the case where the output device or the client system in which the output device is not installed, does not have the calibration function for the reproduced color, a color measurement sample is output on the output device and the color conversion information, which is stored in the color conversion information storage section 13 with being associate with the output device, is corrected based on data obtained by measuring the color measurement sample with the color measuring instrument. If the color measurement sample is analyzed and it is determined that the color reproducibility of the output device outputting the color measurement sample is out of a predetermined criterion, the client system in which the output device is installed can be warned and is promoted to perform the maintenance operation. Also, the calibration can be performed in accordance with the color conversion accuracy. For example, color patches in the color measurement sample are ranked, and when high-accuracy calibration is performed, all the color patches are used; and when low-accuracy calibration is performed, a part of the color patches with low rank is used. For example, in the case where plural pieces of the color conversion information corresponding to color conversion accuracies are stored as shown in Fig. 2, color conversion information for the respective ranks can be performed in accordance with the ranks of the color patches in the color measurement sample.

[0029]

In this way, in the case where the color conversion server 1 performs the calibration processing and there is an output device for which correction processing of the color conversion information has not been performed with using the color measurement sample for a predetermined period, a client system in which the output device is installed is warned and promoted to output the color measurement sample and to adjust the color conversion server 1.

[0030]

10 Status of each output device managed in the color management section 15 may be referred by inquiring from a client system thereto. According to this configuration, a client system attempting to output image data to an output device can output the image data after confirming that color reproducibility is warranted in the given output device. Also, the color management section 15 can charge for various management processings such as correction of the color conversion information and issuance of the warning described above. For example, we can conceive fee in various units such as fee for every management period or fee for every correction of the color conversion information.

[0031]

The client systems 3 and 4 are provided with communication sections 32, and 42 for communicating with the color conversion server 1 and can communicate with the color conversion server

1 through the Internet 2. In the example, the client systems
3, and 4 are also provided with output devices 31 and 43 and
can output the image data undergoing color conversion processing
performed by the color conversion server 1. Thus, the client
5 systems 3 and 4 can receive the image data sent from the color
conversion server 1 at the communication sections 32 and 42
and can print out the image data on the output devices 31 and
43. Accordingly, the output devices 31 and 43 can provide an
image reproduced in a similar reproduced color to the target
10 color. There may be a client system provided with no output
device, or two or more output devices may exist in one client
system. The output devices need not adopt the same print
technology or need not be of the same model and may adopt different
print technologies or may be of different models. Of course,
15 the output device may be a display unit, etc.

[0032]

The client system 4 is further provided with the
above-mentioned instruction terminal 41. In the example, it
is assumed that the client system 4 is a printed matter production
20 system, and printed matter is designed, etc., and image data
is prepared. At this time, the instruction terminal 41 may
be used. The prepared image data together with instruction
information specifying at least the output device is sent from
the instruction terminal 41 to the color conversion server 1
25 and the color conversion server 1 is requested to perform color

conversion processing. For example, if the color information for each target color and for each rank as shown in FIG. 2 is stored in the color conversion server 1, specification of the target color is also sent to the color conversion server 1 as the instruction information. For example, even in a case of outputting to the output device 43 in the client system 4, the image data may be sent to the color conversion server 1 with specification of output to the output device 43 to match the color reproducibility with the target color.

10 [0033]

The image data is arbitrary and may be, for example, code data using PDF, HTML/XML, etc., prepared in the instruction terminal 41 or any other computer, bit map data prepared using a graphics function, an image read through an image reader, or a mixture thereof. The image data undergone color conversion may be in any format; when the color conversion server 1 is requested to perform color conversion processing, the format can be specified or the data format in which data can be received for each output device can be registered.

20 [0034]

Next, an example of the operation of the color conversion system of the invention will be discussed. Here, the operation of the color conversion system for printing out an image on the output device 31 in the client system 3 as instructed from the instruction terminal 41 in the client system 4 will be

discussed briefly.

[0035]

Before color conversion processing is performed, the color conversion information corresponding to the output device 31 in the client system 3 needs to be stored in the color conversion information storage section 13 in the color conversion server 1. The color conversion information can be provided, for example, by outputting an image of a color measurement sample on the output device, measuring the color of the image with a color measuring instrument, etc., and comparing the color-measuring value with the target color. At this time, color conversion information corresponding to plural ranks may be generated. Such color conversion information pieces are previously found for a plurality of target colors and in addition, the color measurement data of the color measurement sample is retained and when conversion to a new target color is required and color conversion information becomes necessary, it may be prepared. Information relating to the target color is retained in the color conversion server 1, and is used to correct color conversion information when a new color measurement sample is introduced.

[0036]

Through the instruction terminal 41, an instruction is given for transmitting image data of printed matter and instruction information specifying the output device 31 in the

client system 3 as the output destination and instruction information of rank (if necessary) to the color conversion server 1 through the communication section 42.

[0037]

5 The color conversion server 1 receives the image data and the instruction information sent from the client system 4 at the communication section 11 and passes them to the color conversion section 12. The instruction information may also be retained in the communication section 11. The color
10 conversion section 12 acquires the color conversion information corresponding to the output device 31 specified as the output destination (further, the target color and the rank) in the instruction information and performs color conversion processing for the image data according to the obtained color
15 conversion information. Further, if an instruction to convert the image data into raster data is given or if the received image data is in a data format that cannot be accepted in the output device 31, the image data undergone the color conversion processing is passed to the rasterizing section 14, which then
20 converts the image data into raster data.

[0038]

For example, if the image data prepared in the client system 4 is data described in PostScript (registered trademark) and the output device 31 can output the data in the data format
25 intact, the color conversion section 12 performs only color

conversion processing for color information in the image data and the image data undergone the color conversion processing is not converted into raster data. If the output device 31 cannot output the data in the data format without conversion
5 or if an instruction to convert the image data into raster data is given as a part of instruction information from the client system 4, the rasterizing section 14 converts the image data undergone the color conversion processing into raster data.
[0039]

10 The image data undergone the color conversion processing of the color conversion section 12 or the image data converted into raster data by the rasterizing section 14 is transferred through the communication section 11 to the client system 3 via the Internet 2. The client system 3 receives the image
15 data transferred via the Internet 2 at the communication section 32 and sends the image data to the output device 31. Accordingly, an image can be printed out from the output device 31.
[0040]

Thus, the image data prepared in the client system 4
20 undergoes color conversion processing in the color conversion server 1 using the color conversion information corresponding to the output device 31 and further is rasterized as required and the data is transferred to the output device 31 in the client system 3 for output. At this time, the color conversion section
25 12 in the color conversion server 1 performs color conversion

processing so that almost the same color as the target color is reproduced upon output of the output device 31 in the client system 3. Therefore, the image output on the output device 31 in the client system 3 is reproduced in almost the same color as the target color; the image reproduced in a color almost similar to that when printed on a printer, for example, can be provided. To output the image data prepared in the client system 4 on the output device 41 in the same client system 4, a similar manner can also be applied.

10 [0041]

Using the color conversion system of the invention, for example, in the production process of general printed matter previously described with reference to FIG. 5, the color image processing system is constructed with the systems in the client 61, the production company 62, the plate-making company 63, etc., as the client systems (particularly, the system in the production company 62 as the client system 4 in FIG. 1), whereby the comprehensive layout 72 prepared in the production company 62 can be output on the printer installed in the client 61. In this case, as color conversion processing is performed in the color conversion server 1, color conversion processing responsive to the printer installed in the client 61 and the used printer 91 is performed and thus color reproduction almost equivalent to that on the proof 86 prepared in the plate-making company 63 can also be provided on the printer installed in

the client 61. Of course, when the printer in the plate-making company 63 outputs, color reproduction almost equivalent can be achieved. Therefore, production can be advanced using the image with almost equivalent color reproduction at any stage
5 of production process of printed matters.

[0042]

In the description of the embodiment, the color conversion information stored in the color conversion information storage section 13 of the color conversion server 1 is used only in
10 the color conversion server 1. However, for example, the color image processing system may be configured so that the color conversion information stored in the color conversion information storage section 13 can be downloaded into the client system. Any desired color conversion information of the
15 downloaded color conversion information may be selected and transferred to the color conversion server 1 as a part of instruction information together with image data for requesting the color conversion server 1 to perform color conversion processing for the image data. The color conversion server
20 1 may use the color conversion information sent from the client system to perform color conversion processing by the color conversion section 12.

[0043]

If the output device has a color conversion processing
25 function using color conversion information, the color

conversion server 1 may transfer the color conversion information corresponding to instruction information together with image data to the output device without performing color conversion processing. In this case, color conversion
5 processing is performed in the output device in accordance with the color conversion information sent from the color conversion server 1. Also in this case, the color conversion information is information set so as to provide the same output color as the target color in the output device and thus if color conversion
10 processing is performed and output is produced, almost the same color as the target color can be reproduced. Transferring the color conversion information to the output device or performing color conversion processing in the color conversion server 1 can be selected in response to the output device. If the output
15 device does not have the function of reading the color conversion information and performing color conversion processing, color conversion processing may be performed in the color conversion server 1. Even if the color conversion information is transferred to the output device, rasterizing processing for
20 the image data may be performed in the color conversion server 1.

[0044]

As described above, using the color conversion system of the invention, images reproduced in almost equivalent colors
25 can be provided on any output devices. However, images

reproduced in almost equivalent colors can be provided on any output devices when a color measurement sample used as the basis for preparing the color conversion information corresponding to each output device is output; the color reproducibility is not guaranteed with change of the output device with time, replacement of the parts, etc. Of course, color change with time is moderate unless a failure occurs, and if calibration processing is executed at reasonable intervals, the color reproducibility can be almost guaranteed. Therefore, reproduced color calibration processing for each output device maybe performed within a predetermined time period. Of course, whenever a fault occurs or the parts are replaced, calibration processing may be performed.

[0045]

FIG. 3 is a schematic representation of an example of the operation when calibration processing can be performed in the client system. In the figure, numeral 33 denotes a color measurement sample and numeral 34 denotes a color measuring instrument. Here, the operation when calibration processing of the output device 31 can be performed in the client system 3 will be discussed briefly. In this case, calibration processing is performed in the client system 3 and thus basically the color conversion information in the color conversion server 1 need not be changed. However, unless it can be checked that calibration processing is actually performed, the color

reproducibility cannot be guaranteed, and the calibration processing must be performed correctly. Thus, the color conversion server 1 checks to ensure that calibration processing is actually performed and checks the calibration processing
5 for validity to some extent.

[0046]

To perform the calibration processing, for example, the color measurement sample 33 containing a predetermined color patch is printed out on the output device 31, the color of the
10 color patch drawn on the color measurement sample 33 is measured with the color measuring instrument 34, and the color measurement value is input to the output device 31 or any other computer. Conversion data for inversely correcting the variation in the color reproducibility in the output device 31 is computed based
15 on the color measurement value of the color measuring instrument 34, and is registered in the output device 31. To later print out, the registered conversion data is used to execute color conversion processing.

[0047]

20 If the calibration processing is thus performed, the date and time of the calibration processing, the color measurement value of the color measuring instrument 34, and the like are retained as calibration information. When a scheduled inquiry is received from the color conversion server 1, the calibration
25 information is transferred to the color conversion server 1.

Alternatively, when the calibration processing has been performed, the calibration information is transferred to the color conversion server 1. Particularly, after the parts are replaced or a repair is made, there is a possibility that the color may be changed largely and thus immediately the calibration information should be transferred to the color conversion server 1.

[0048]

If the color conversion server 1 receives the calibration information returned responding to the inquiry made for the client system 3, it checks the executing date and time of the calibration processing and determines whether or not the time interval between the last calibration processing and the current calibration processing is equal to or longer than a predetermined time period. If the time interval is equal to or longer than the predetermined time period, the color conversion server 1 warns the client system 3 to execute calibration processing. At this point in time, the management information in the color management section 15 is changed to the condition to the effect that the color reproducibility cannot be guaranteed because of the passage of the predetermined time period. At the point in time when the predetermined time period has elapsed since the date and time of the last calibration processing rather than when the calibration information is received from the client system 3, the color conversion server 1 may warn the client

system 3 and change the management information.

[0049]

If the received calibration information is newer than the previously received calibration information, the executing date and time of the calibration processing are updated. The color measurement value is analyzed and whether or not the color reproducibility is out of a predetermined criterion is determined. If it is determined that the color reproducibility is out of the predetermined criterion, the color conversion server 1 warns the client system 3 and informs the client system 3 that the current status is status in which the color reproducibility cannot be guaranteed if calibration processing is performed. In such a case, often it becomes necessary to maintain the output device 31.

15 [0050]

If the client system 3 sends calibration information to the color conversion server 1 voluntarily, the color conversion server 1 updates the date and time of the last calibration processing to the date and time in the received calibration information. The color conversion server 1 analyzes the color measurement value and determines whether or not the color reproducibility is out of the predetermined criterion, as described above.

[0051]

25 If the color measurement value of the received calibration

information is within the criterion, it is determined that the color reproducibility is guaranteed, and the management information in the color management section 15 is set to the condition to the effect that the color reproducibility is
5 guaranteed. If precise color reproduction cannot be conducted if calibration processing of the output device 31 is simply performed, the color conversion information corresponding to the output device 31 may be corrected based on the received calibration information.

10 [0052]

FIG. 4 is a schematic representation of an example of the operation when the client system or the output device does not have the calibration function. In the figure, numeral 16 denotes a color measuring instrument and numeral 44 denotes
15 a color measurement sample. Here, the operation when neither the client system 2 nor the output device 43 can perform calibration processing of the output device 43 will be discussed briefly. If calibration processing of the output device cannot be performed in the client system, the color conversion server
20 1 performs equivalent calibration processing.

[0053]

First, the color measurement sample 44 containing a predetermined color patch is printed out on the output device 43. The color measurement sample 44 is brought into or sent
25 to the management company of the color conversion server 1 and

the color of the color patch drawn on the color measurement sample 44 is measured with the color measuring instrument 16 installed in the color conversion server 1. The color measurement value of the color measuring instrument 16 is input
5 to the color management section 15 or any other computer and considering the variation in the color reproducibility in the output device 43, the color conversion information is corrected based on the color measurement value. Alternatively, the color conversion information containing the variation in the color
10 reproducibility in the output device 43 may be again computed for correcting the color conversion information. The corrected color conversion information is stored in the color conversion information storage section 14. The output date and time of the color measurement sample 44 or the correction processing
15 date and time of the color conversion information are retained.
[0054]

Thus, in the case where the output device 43 or the client system 2 does not have the calibration function of the output device 43, the color conversion server 1 corrects the color
20 conversion information in response to the variation in the color in the output device 43 and performs calibration processing. Such calibration processing is performed at predetermined time intervals or whenever the parts are replaced or a repair is made, whereby color conversion processing responsive to the
25 color reproduction state of the output device 43 can always

be performed at the color conversion time and the color reproducibility can be guaranteed.

[0055]

The calibration processing can be performed with the rank
5 responsive to the color conversion accuracy. For example, the
color patches drawn on the color measurement sample 44 are ranked
and all color patches are used to execute calibration processing
in the rank for performing color conversion processing with
high accuracy. In the rank for performing color conversion
10 processing with low accuracy, some of the color patches can
be used to execute calibration processing. Thus, the
calibration processing accuracies can be ranked depending on
the number of the used ones of the color patches drawn on the
color measurement sample. Such ranking can be performed in
15 accordance with specification of the calibration accuracy from
the user or in the configuration wherein the color conversion
information can be set for each rank as shown in FIG. 2, the
calibration processing with the color conversion accuracy in
each rank can be performed as the number of the used color patches
20 is varied. Furthermore, it can be conceived to change fee in
accordance with ranks of the calibration processing.

[0056]

The color management section 15 analyzes the result of
measuring the color of the color measurement sample 44 output
25 from the output device 43 with the color measuring instrument

16 and determines whether or not the color reproducibility in the output device 43 is out of a predetermined criterion. If the color reproducibility is within the predetermined criterion, the color conversion information is corrected as described above.

5 On the other hand, if it is determined that the color reproducibility is out of the predetermined criterion, the color management section 15 warns the client system 2 and informs the client system 2 that the current status is a status in which the color reproducibility cannot be guaranteed if calibration

10 processing is performed. The color management section 15 also monitors the elapsed time since the executing date and time of the last calibration processing and if calibration processing using the next color measurement sample 44 is not performed during a predetermined time period, the color management section

15 15 warns the client system 2 to send the color measurement sample 44 to the color conversion server 1 after the expiration of the predetermined time period. If the color management section 15 warns the client system 2, it changes the management information to the condition to the effect that the color

20 reproducibility cannot be guaranteed.

[0057]

Thus, the color management section 15 can always provide agreement between the reproduced colors by performing color conversion processing with high accuracy in response to color

25 change of the output device with time or color change caused

by replacing the parts or making a repair regardless of whether or not the output device or the client system in which the output device is installed has the calibration function.

[0058]

5 If color conversion processing with high accuracy cannot be guaranteed, the color management section 15 also provides information indicating the fact. For example, the client system inquires about management information with specification of the output device, whereby the management
10 information of the output device can be referenced. If the management information indicates the condition to the effect that color reproducibility cannot be guaranteed, countermeasures of producing no output, etc., are taken, so that the reproduced color variation from one output device to
15 another can be prevented.

[0059]

 In the description given above, if it becomes impossible to guarantee color reproduction, the client system is warned. In addition, for example, when the time approaches the
20 calibration processing period, the client system may be informed of the fact. The color management section 15 and the color conversion section 13 can also be operated in association so as to reject color conversion processing with specification of the output device whose color reproduction cannot be
25 guaranteed or send a message indicating that color reproduction

cannot be guaranteed to an orderer for acknowledgement, etc.

[0060]

It is possible to charge for various management processing for guaranteeing such color reproduction, and to charge in view
5 of various factors such as management content, management period and processing content.

[0061]

As apparent from the above description, according to the invention, the color conversion information is set for each
10 output device so that a color output on each output device matches a target color (for example, reproduced color in a proof), and the color conversion processing is performed for image data using this color conversion information. Thereby, reproduction color of image data can be matched with any output
15 device.

[0062]

Further, in the invention, color management in each output device is executed in the color conversion server. For example, if the output device or the client system in which the output
20 device is installed has the calibration function for adjusting the color reproducibility of the output device, management is conducted as to whether or not calibration processing is performed periodically, whether or not the color reproducibility of the output device is out of a predetermined
25 criterion, etc. For example, if the output device or the client

system in which the output device is installed cannot execute calibration, the color conversion server performs calibration processing and also conducts management as to whether or not the calibration processing is performed periodically, whether
5. or not the color reproducibility of the output device is out of a predetermined criterion, etc. The color management in each output device is thus executed in the color conversion server, whereby the color reproducibility can always be guaranteed.

10 [Brief Description of the Drawings]

[Fig. 1] A configuration diagram showing one embodiment of a color conversion system of the invention.

[Fig. 2] A schematic representation of an example of the configuration of the color conversion information storage
15 section.

[Fig. 3] A schematic representation of an example of the operation when calibration processing can be performed in the client system.

[Fig. 4] A schematic representation of an example of
20 the operation when the client system or the output device does not have the calibration function.

[Fig. 5] An explanatory drawing showing an example of an outline of a production process of general printed matter.

[Description of Numerals]

25 1 ... color conversion server, 2 ... the Internet, 3, 4 ... client

systems, 11, 32, 42 ... communication sections, 12 ... color
conversion section, 13 color conversion information storage
section, 14 ... rasterizing section, 15 ... color management
section, 16 ... color measuring instrument, 14, 34 ... output
5 devices, 33 ... color measurement sample, 34 ... color measuring
instrument, 41...instruction terminal, 44...colormeasurement
sample, 61 client, 62 ... production company, 64 ... printing
company, 71 ... production system, 72 ... comprehensive layout,
81 ... image setter, 82 ... film, 83 ... plate-making, 84 ... PS plate,
10 85 ... flatbed proofreading machine, 86 ... proof, numeral, 91
... printer, and 92 ... printed matter.

[Name of Document] Abstract

[Abstract]

[Object] To provide a color conversion system and a color conversion server, which can obtain an image of a printed matter, 5 which has the same color reproduction as the final printed matter, at any stage, with any output device and any time.

[Solving Means] A color conversion information storage section 13 stores in advance color conversion information, which are set so that reproduction color by an output device 31, 41 is 10 a target color, with associating the color conversion information with each output device. Also, the color management section 15 manages periods that has elapsed since the last calibration processing performed in each output device and as to whether or not color reproducibility in each output 15 device is guaranteed. Thereby, good color reproducibility can be always guaranteed while dealing with change of each output device in color with time or change of color reproducibility due to part replacement or repair.

[Selected Drawing] Fig. 1

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【書類名】 ~~図面~~ Drawings

【図1】 Name of Document

Fig 1

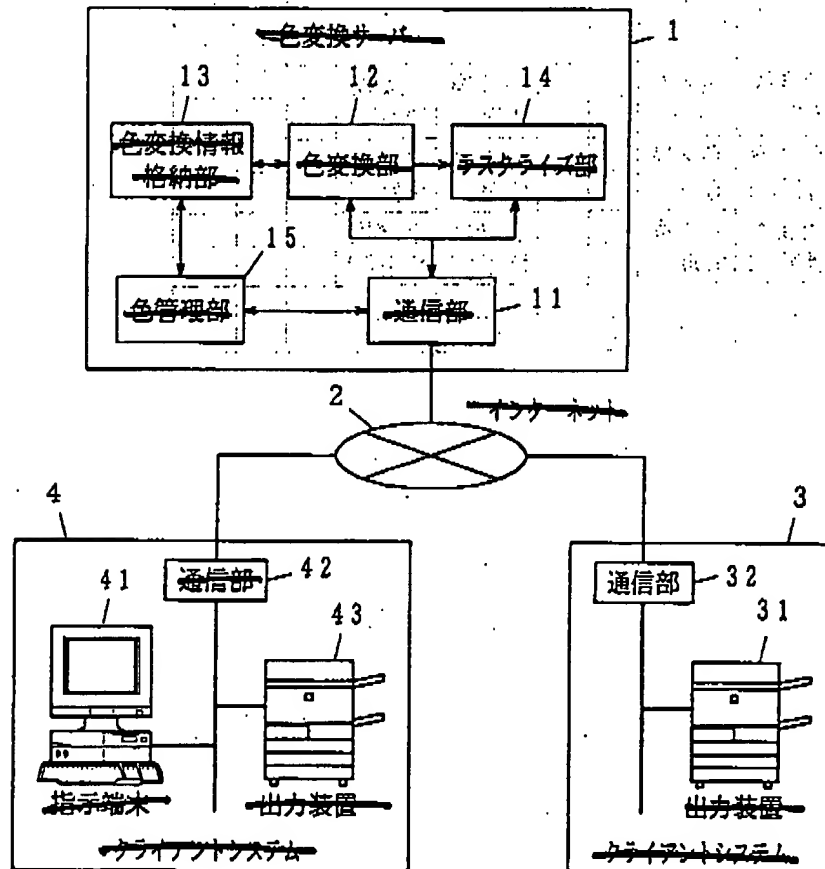


FIG. 1

- 1 COLOR CONVERSION SERVER
- 2 THE INTERNET
- 3 CLIENT SYSTEM
- 4 CLIENT SYSTEM
- 11 COMMUNICATION SECTION
- 12 COLOR CONVERSION SECTION
- 13 COLOR CONVERSION INFORMATION STORAGE SECTION
- 14 RASTERIZING SECTION
- 15 COLOR MANAGEMENT SECTION
- 31 OUTPUT DEVICE
- 32 COMMUNICATION SECTION
- 41 INSTRUCTION TERMINAL
- 42 COMMUNICATION SECTION
- 43 OUTPUT DEVICE

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【図2】

Fig. 2

	クライアントシステム2 (1)				クライアントシステム3 (2)				...
	出力装置21 (3)				出力装置31 (4)				
	リンク1 (5)	リンク2 (6)	リンク1 (7)	リンク2 (8)	
target A ~ ターゲットA	色変換情報a-1 (9)	色変換情報a-2 (10)	...	...	色変換情報b-1 (11)	色変換情報b-2 (12)	...	...	...
target B ~ ターゲットB	色変換情報c-1 (13)	色変換情報c-2 (14)	...	...	色変換情報d-1 (15)	色変換情報d-2 (16)	...	...	...
target C ~ ターゲットC	色変換情報e-1 (17)	色変換情報e-2 (18)	...	...	色変換情報f-1 (19)	色変換情報f-2 (20)	...	...	...
...

FIG. 2

- (1) CLIENT SYSTEM 2
- (2) CLIENT SYSTEM 3
- (3) OUTPUT DEVICE 21
- (4) OUTPUT DEVICE 31
- (5) RANK 1
- (6) RANK 2
- (7) RANK 1
- (8) RANK 2
- (9) COLOR CONVERSION INFORMATION A1
- (10) COLOR CONVERSION INFORMATION A2
- (11) COLOR CONVERSION INFORMATION B1
- (12) COLOR CONVERSION INFORMATION B2
- (13) COLOR CONVERSION INFORMATION C1
- (14) COLOR CONVERSION INFORMATION C2
- (15) COLOR CONVERSION INFORMATION D1
- (16) COLOR CONVERSION INFORMATION D2
- (17) COLOR CONVERSION INFORMATION E1
- (18) COLOR CONVERSION INFORMATION E2
- (19) COLOR CONVERSION INFORMATION F1
- (20) COLOR CONVERSION INFORMATION F2

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〔図3〕

Fig. 3

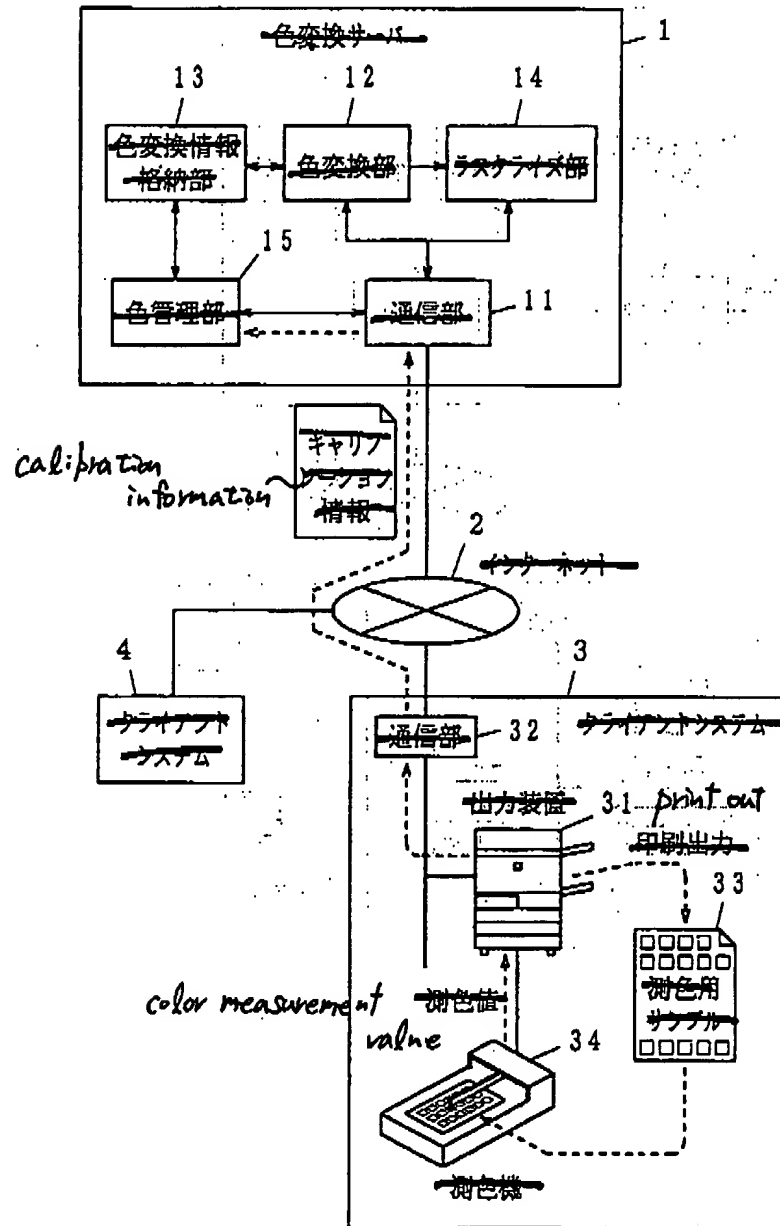


FIG. 3

- 1 COLOR CONVERSION SERVER
- 2 THE INTERNET
- 3 CLIENT SYSTEM
- 4 CLIENT SYSTEM
- 11 COMMUNICATION SECTION
- 12 COLOR CONVERSION SECTION
- 13 COLOR CONVERSION INFORMATION STORAGE SECTION
- 14 RASTERIZING SECTION
- 15 COLOR MANAGEMENT SECTION
- 31 OUTPUT DEVICE
- 32 COMMUNICATION SECTION
- 33 COLOR MEASUREMENT SAMPLE
- 34 COLOR MEASURING INSTRUMEN

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【図4】

Fig. 4

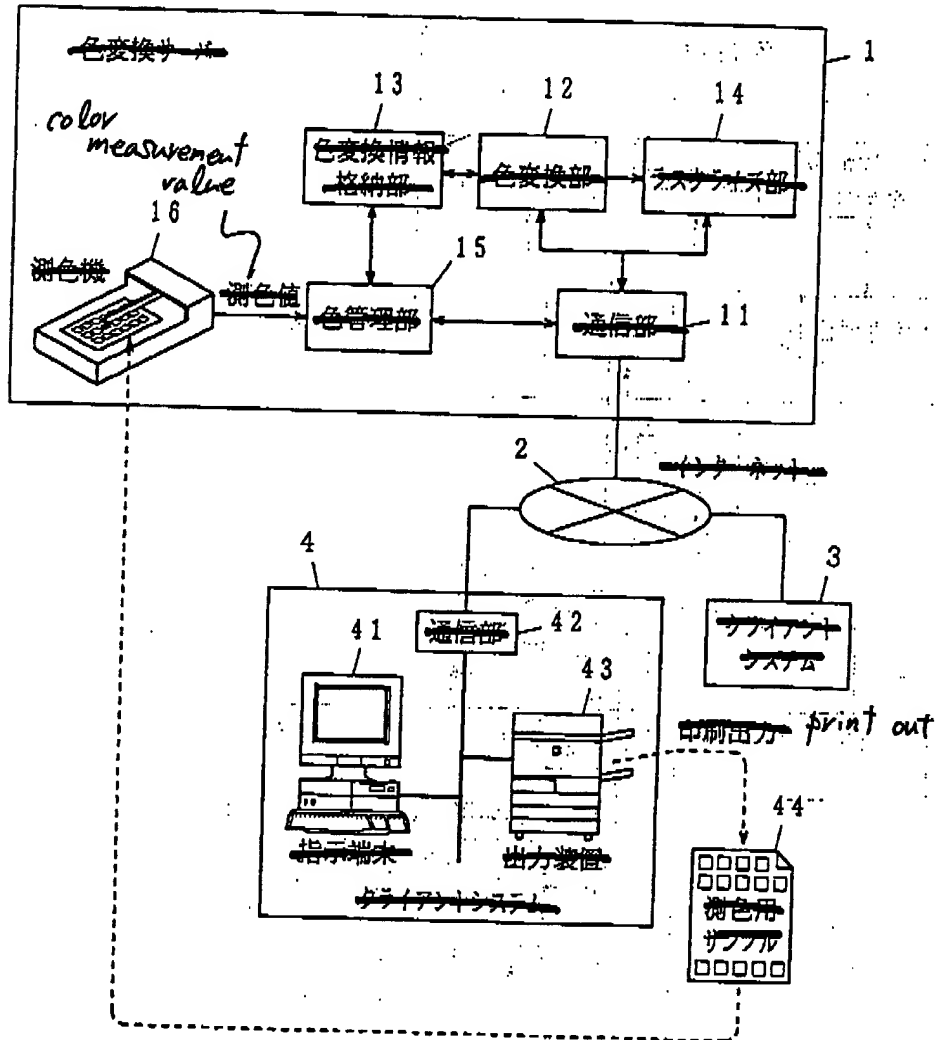


FIG. 4

- 1 COLOR CONVERSION SERVER
- 2 THE INTERNET
- 3 CLIENT SYSTEM
- 4 CLIENT SYSTEM
- 11 COMMUNICATION SECTION
- 12 COLOR CONVERSION SECTION
- 13 COLOR CONVERSION INFORMATION STORAGE SECTION
- 14 RASTERIZING SECTION
- 15 COLOR MANAGEMENT SECTION
- 16 COLOR MEASURING INSTRUMENT
- 41 INSTRUCTION TERMINAL
- 42 COMMUNICATION SECTION
- 43 OUTPUT DEVICE
- 44 COLOR MEASUREMENT SAMPLE

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図5

Fig. 5

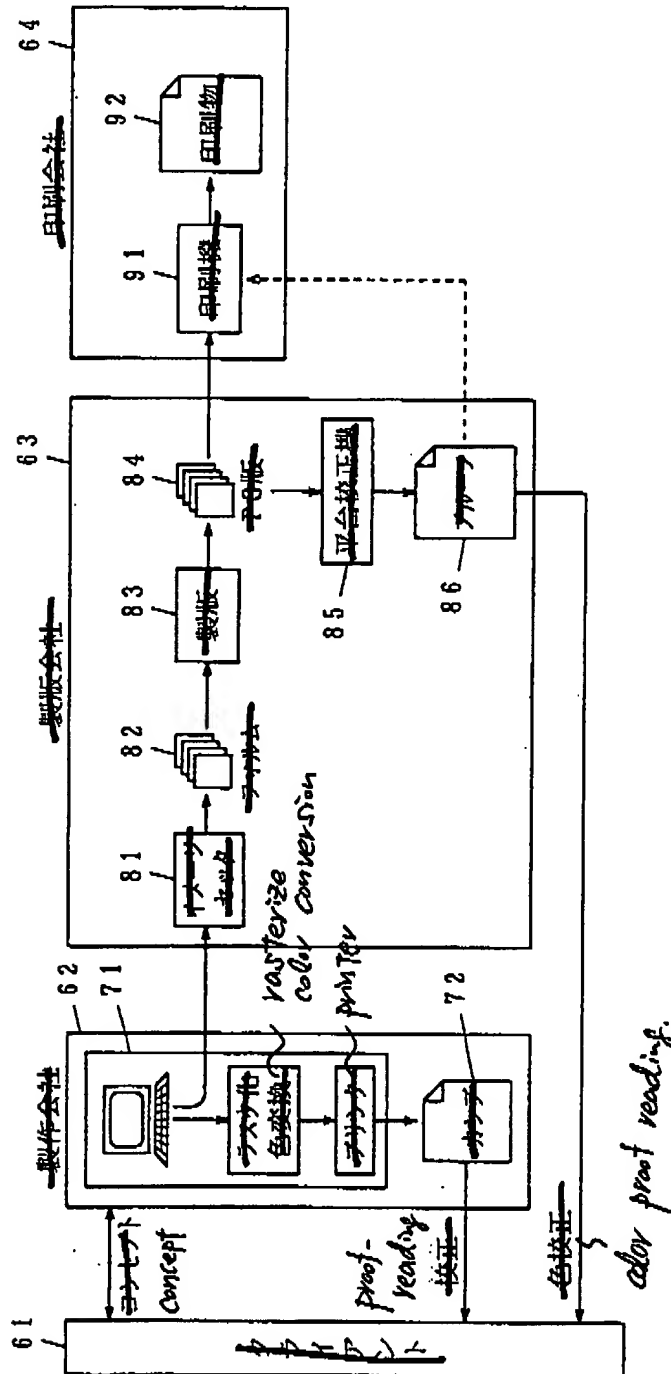


FIG. 5

- 61 client
- 62 production company
- 63 plate-making company
- 64 printing company
- 72 comprehensive layout
- 81 ... image setter
- 83 plate-making
- 84 PS plate
- 85 flatbed proofreading machine
- 86 proof
- 91 printer
- 92 printed matter

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